1B2AG

R17 Regulation *Subject: 1B2AG*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech. I Year IISemester Supplementary Examinations, June 2024

MATHEMATICS-II

(Common to EEE,ECE,CSE & IT)

Maximum Marks: 70 Date: 26.06.2024 Duration: 3hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a,b,c,d as sub questions.

Part-A

All the following questions carry equal marks 10X2M=20 Marks

1. Write the relation between Beta and Gamma function.
2. Evaluate $\int_0^1 x^5 (1-x)^3$ dx
3. Evaluate $\int_0^2 \int_0^x e^{x+y} dx\, dy$
4. Find $\int \int_R x^2 dx\, dy$ over the region bounded by hyperbola xy=4 ; y = o; x = 1; x = 4
5. Find $grad\ \phi$ at (1,0,2) where $\phi = x^2y + 2xz^2 - 8$
6. What is the value of $div\ \vec{r}$?
7. If $\nabla\emptyset = x\vec{i} + y\vec{j} + z\vec{k}$, find the scalar potential
8. State Stoke's theorem
9. Find Laplace transform of Sin2t.
10. Find $L^{-1}\left[\frac{1}{(s+1)^2}\right]$

Part-B

Answer all the questions (5X10M=50M)

11. (a) Prove that $\Gamma n\, \Gamma 1-n = \frac{\pi}{\sin n\pi}$ [5m]
    (b) Prove that β(m,n) = β (n,m) [5m]

(OR)

12. Evaluate $\int_0^\infty e^{-ax} x^{m-1} sinbx\ dx$ in terms of Gamma function. [10m]

13. Evaluate $\iiint_R^{\square} dx\,dy\,dz$ where 'R ' is the finite region of space formed by the planes x=0,y=0,z=0 and 2x +3y+4z=12. [10m]

(OR)

14. Change the order of integration and evaluate $\int_0^1 \int_0^x dydx$ [10m]

15. (a) If F =y $(ax^2 + z)$ i+ x $(y^2 - z^2)$ j + 2xy (z-xy) k is solenoidal then find a. [5m]

(b) Find the directional derivative of $1/r$ in the direction of r = x $\bar{\imath}$ + y $\bar{\jmath}$ + z $\bar{k}$ at (1,1,2) [5m]

(OR)

16. (a) Find the value of the constants a, b, c so that the vector. [5m]

$\vec{F} = (x + 2y + az)\vec{\imath} + (bx - 3y - z)\vec{\jmath} + (4x + cy + 2z)\vec{k}$ is irrotational.

(b) Find the value of 'a' so that the vector $\vec{F} = (x + 3y)\vec{\imath} + (y - 2z)\vec{\jmath} + (x + az)\vec{k}$ is Solenoidal. [5m]

17. Evaluate $\int_C^{\square} (xy + x^2)dx + (x^2 + y^2)dy$, where C is the square bounded by the lines x=-1,x=1,y=-1,y=1 using Green's theorem. [10m]

(OR)

18. Use divergence theorem to evaluate $\vec{F} = 4x\vec{\imath} - 2y^2\vec{\jmath} + z^2\vec{k}$ and S is the surface bounded the region x^2+y^2=4, z=0 and z=3. [10m]

19. (a) Evaluate $L^{-1}\left[\frac{1}{s^2+6s+13}\right]$. [5m]

(b) Find the Laplace transform of $f(t) = \frac{1-e^{-t}}{t}$. [5m]

(OR)

20. Solve the differential equation $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = e^{2t}$ with y(0) = -3 and $y'(0) = 5$ using Laplace transform. [10m]